Over ten years of archaeological work in Syria – SYGIS, the archaeological survey and mapping project of Jebel Bishri in Syria

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Abstract

SYGIS, the *Finnish Archaeological Survey and Mapping Project of Jebel Bishri in Syria*, was initiated in the late 1990s when the project plan was accepted by the Syrian General Directory of Antiquities and Museums (DGAM) and NASA's world monitoring programme. The cooperation with NASA meant receiving X-SAR Shuttle Mission 2000 remote-sensed data from Jebel Bishri, a mountainous region between the Syrian Desert and the Euphrates River. The Institute for Cultural Research at the University of Helsinki was then the home institution of the project led by Dr. Minna Lönnqvist (presently Silver), and the Academy of Finland provided the project's initial funding. The aim of the project was to survey and map the largely archaeologically unexplored area of Jebel Bishri known as the mountain of the Amorites and Arameans in the ancient cuneiform sources. Based on the data, the main purpose was to study the relationship of pastoral nomads and sedentary people between the desert-steppe and the Euphrates River throughout the ages. The project used remote sensing, fieldwork and Geographic Information Systems (GIS) for data capture, mapping and analysis. Apart from the mobile cultures, important finds were traced dating from the Roman and Byzantine period. The work was carried out in 2000–2010 and included a Nordic research training course funded by NorFA (NordForsk) and a GIS course for some staff members of DGAM funded by the Finnish Foreign Ministry. Nokia Co. sponsored the project. The final reports were published in the *BAR International Series* of Archaeopress, Oxford, England, in 2008 and 2011, in addition to dozens of other publications.

Keywords: Syria, archaeology, pastoralists, mobile cultures, Amorites, Arameans, Romans, remote sensing, survey, mapping, GIS

Zooming in on Jebel Bishri in Syria

Finnish archaeologists, photogrammetrists, remote sensing and GIS experts from the University of Helsinki and Helsinki University of Technology (presently Aalto University) launched the Syrian Geographic Information Systems (SYGIS) project for archaeological surveying and mapping of ancient sites in the mountainous region of Jebel Bishri in central Syria in 1999/2000 following the 1997 negotiations with the Syrian General-Directory of Antiquities and Museums (DGAM). The project was then led by Dr. Minna Lönnqvist and since 2004 also by Kenneth Lönnqvist (presently Silver) as vice-director (see SYGIS website).

According to the Arab Centre for Studies of Arid Zones and Dry Lands (ACSAD), the area of Jebel Bishri (Figure 1) covers approximately one million hectares. The mountain has been the habitat for mobile people living between the Syrian Desert and the Euphrates River for millennia (see a more detailed account of the project and its procedure in Silver 2021b). The project was following in the footsteps of the Finnish orientalist Georg August Wallin who had been in contact with the Bedouins of the district in the

19th century (c.f. Palva 2013). The area belongs to desert-steppe, and the mountain consists of gypsum, limestone, marble and basalt. The area has been used for oil drilling in recent decades.

The project's aim was to survey and map the largely archaeologically unexplored area of Jebel Bishri known as the mountain of the Amorites (Buccellati 1966, 236–237) and Arameans (Kupper 1957, 110) in the ancient cuneiform sources. Based on the captured data, the main purpose was to study the relationship of pastoral nomads and sedentary people between the desert-steppe and the Euphrates River from a long-term perspective. The project was using remote sensing with satellite imagery and Geographic Information Systems (GIS) for archaeological prospecting, surveying and mapping. The project's main scientific question focused on pastoralism and nomadism, although all sites in its survey were recorded and documented equally in the studied areas.

In 1999 the Finnish project was accepted into NASA's world monitoring program through the German Aerospace Centre (DLR), and the Academy of Finland granted funding for the pilot work on the field in Syria. The cooperation through the German Aerospace Centre with NASA meant participation in the X-SAR shuttle mission 2000 program receiving radar data (Lönnqvist 2003a), such as elevation data in DEM (digital elevation model) tiles, from the Jebel Bishri region. Further funding was received from NorFA (present NordForsk) as well as a sponsorship from Nokia Co. for field studies. The project also included planning, fundraising and arranging for GIS education for the staff of the DGAM in cooperation with the Finnish Foreign Ministry and ACSAD (Silver 2022). The SYGIS work was carried out under the Museum of Palmyra and the Museum of Deir ez-Zor, but it was officially and solely a Finnish project, not a joint Finnish-Syrian project.

A Nordic NorFA (presently NordForsk) research training course for PhD studies that included the Universities of Uppsala, Bergen and Copenhagen and the Finnish Universities of Helsinki and Oulu was integrated into the project design. The 2004 course included field work (Figure 2), seminars in the neighbourhood of Palmyra, Jebel Bishri and Deir ez-Zor, and field trips to archaeological sites. The Nordic seminars' student papers were published in 2008 (Lönnqvist 2008a). Cooperation for field studies with the researchers from the University of Halle-Wittenberg, Germany, occurred in 2005 (Lönnqvist 2005a; 2005b; Lönnqvist *et al.* 2009b; 2011). The project included archaeologists, photogrammetrists, assyriologists, theologians, geodets, geologists, historians, biologists, and engineers throughout the years 2000–2010 under the University of Helsinki; their nationalities comprised Finns, Syrians, Germans, Swedes, Norwegians, Danes and US citizens. DGAM provided

Figure 1. The location of Jebel Bishri on a satellite image. Mapping by Minna Lönnqvist (Silver).

Figure 2. A field camp on Jebel Bishri in 2004. Photo: Gullög Nordquist.

local field assistants from the Museum of Palmyra and Deir ez-Zor, such as Mr. Mohammed Taha, Mr. Mohammed al-As'aad, Mr. Yasser Souhan and Mr. Muhammed Nazi.

Methodological approaches

Developments in the archaeology of nomadism had opened a new window of opportunity in the 1990s to study pastoral nomads who had earlier been largely thought to be invisible in archaeological record. Jebel Bishri has been regarded as the 'home region' of the West Semitic pastoral tribes called the Amorites and the Arameans, the former having been active during the entire Bronze Age and the latter occurring in the neighbourhood from the Iron Age until today. Both groups of people are mentioned in ancient Mesopotamian cuneiform sources, where they first appear as mobile pastoralists and village dwellers (see Lönnqvist 2000a; Silver 2019).

The choice of Jebel Bishri as the target of archaeological studies was associated with Minna Lönnqvist's first visit to Syria in 1997 related to her doctoral studies. Negotiations started then concerning a GIS project with DGAM of Syria. It was realised that Jebel Bishri, 'the Mountain of the Amorites', had remained archaeologically a kind of *terra incognita* and needed archaeological surveying. It was also realised that it would be an ideal area for a GIS project. Giorgio Buccellati and Marilyn Kelly-Buccellati (1967) had paid a short archaeological visit to the mountain's area in the 1960s. Lönnqvist's doctoral dissertation on the archaeological remains of the Amorites was finished, defended and accepted in the Archaeology Department at the University of Helsinki in 2000 (Lönnqvist 2000a).

The first field season occurred in the summer of 2000. The survey took into account all kinds of human groups, in different periods, besides the study of pastoral nomads and village people. This is a holistic and ethical way to proceed in a survey, rather than to prefer and choose certain remains by paying attention only to certain restricted time periods (Lönnqvist *et al.* 2006c). Themes of contextual archaeology following Karl Butzer (1982, 7) were applied by studying such components as 1) space, 2) scale, 3) complexity, 4) interaction and 5) equilibrium state. Environmental and landscape studies were applied on a macroscale. Ethnoarchaeological studies were carried out in more recent Bedouin compounds by applying Michael Schiffer's (1982) methodology to study processes of site abandonment behaviour. A *longue durée* approach was achieved in this way. Apart from the long-term view, large-scale approaches were applied to the

environment and landscape studies by remote sensing using satellite imagery and radar data for prospecting and field mapping.

The whole mountain was covered by prospecting with satellite imagery during the project. A variety of satellite imagery was used: CORONA declassified photographs, Landsat, SPOT, QuickBird imagery and Aster-DEM images (Lönnqvist *et al.* 2011). The CORONA photographs were digitised and have been used since 2001 (Lönnqvist & Törmä 2003). Project director Minna Lönnqvist carried out archaeological mapping based on orthorectified Landsat-7 satellite images by applying MapSheets Express software, and Dr. Jari Okkonen produced site maps on the ground with total station (EDM). Photogrammetrist Markus Törmä constructed landscape models and carried out analyses of various kinds by applying remotely sensed data including visibility, site-catchment and desertification analyses. The project was mentioned in the Finnish national committee report of Space Committee Research (COSPAR 2008). Digital landscape models were produced by total station and by using X-SAR mission radar data fused with Landsat satellite imagery (Figure 3; Lönnqvist *et al.* 2011) as well as by using Aster-DEM with QuickBird imagery that provided high spatial resolution (Lönnqvist *et al.* 2012).

Fieldwork was allocated to different kinds of environmental zones to determine the differences in material remains and cultures. The areas were desert-steppe and the river valley, the mountain and its piedmonts. The empirical and systematic field work concerned restricted areas chosen for field walking on the ground in 15 m interval transects. That provided a way to capture UTM site coordinates with GPS data; thus, medium- and micro-scale evidence for applying Geographic Information Systems (GIS). Digital cameras as well as traditional analogue cameras were used for documentation in the field; the data sustainability was taken into account using analogue films because the sustainability of digital data was unknown. Particular field record sheets were kept. No maps had been received from the Syrian officials for military reasons. The project used both UK military aviation maps and Russian topographical maps for image rectification and field studies. Field maps were also produced on Landsat-7 satellite imagery by Minna Lönnqvist using ERDAS MapSheets software (see methodology in Lönnqvist & Törmä 2003; Lönnqvist 2004; Lönnqvist & Törmä 2004; Lönnqvist & Stefanakis 2009; Lönnqvist *et al.* 2011).

Looking for mobile cultures

The number of prehistoric finds in the western area of the mountain proper and its western piedmont was overwhelming; the finds included Palaeolithic,

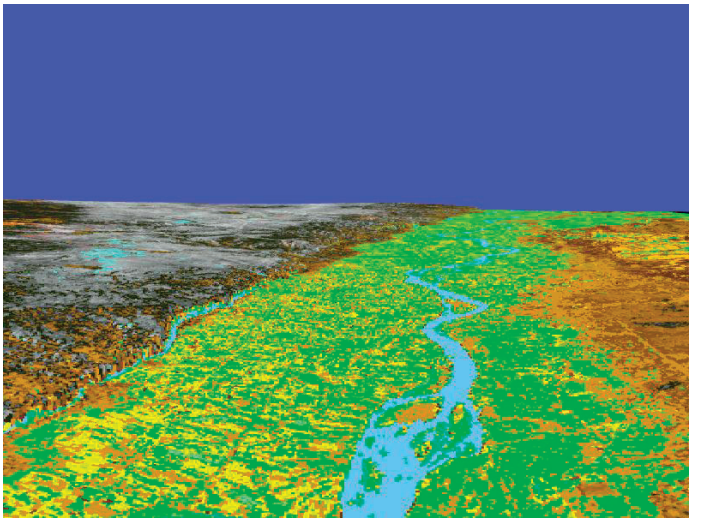

Figure 3. Landscape model of Jebel Bishri along the Euphrates from east to west, constructed by fusing Landsat images with X-SAR shuttle mission 2000 radar data. Constructed by Markus Törmä.

Epipalaeolithic and Neolithic flint tools and debitage. Abris, rock shelter sites, were recorded at the western escarpment called Tar al-Sbai (Figure 4; Table 1). The development from hunter-gatherer groups to pastoral nomadism can be followed on the sites at the edge and in the mountain's inner areas. The relationship between animals and humans was observed and studied in the change from gazelle hunting to domestication and small livestock rearing. The desert-steppe environment of the mountain had affected the choice of subsistence economy, dependent on the mobile way of life.

The El Kowm Oasis (Figure 4) on the western piedmont with its numerous prehistoric sites was the base for both mobile and initial sedentary groups visiting the mountain to acquire prey and acting in the change. The plateau area beneath the mountain was full of open, accumulated Palaeolithic sites, but Palaeolithic activities were also recorded on the mountain (Lönnqvist *et al.* 2011; Lönnqvist 2013; Table 1). The highland–lowland interaction between the piedmont and the mountain had already started in prehistoric times when gazelle hunting was a major hunting activity in the region that belonged to the Levantine corridor, where the seasonal gazelle route has been identified. Various worked flint finds pointed to the processing of carcasses at the edge of the mountain (Lönnqvist *et al.* 2011, 128; 2012).

A palaeolake area was identified on the mountain, providing Palaeolithic and Epipalaeolithic activities that had occurred in association with the lake. The microlithic finds recovered were representing the Epipalaeolithic transformation from the subsistence economy and mode of life towards semi-sedentarism. Signs of sedentarisation dating to the Pre-Pottery Neolithic B (PPNB) period seemed to emerge. The documentations and visibility analyses from the mountain sites of the aforementioned mobile people visiting and staying at the edge were applied (Lönnqvist *et al.* 2001; 2011).

Stone enclosures/corrals, i.e., animal pens (Figure 5) and cairns/*tumuli* (Figure 6), were the most typical structural remains evidencing that pastoral groups had been living on the

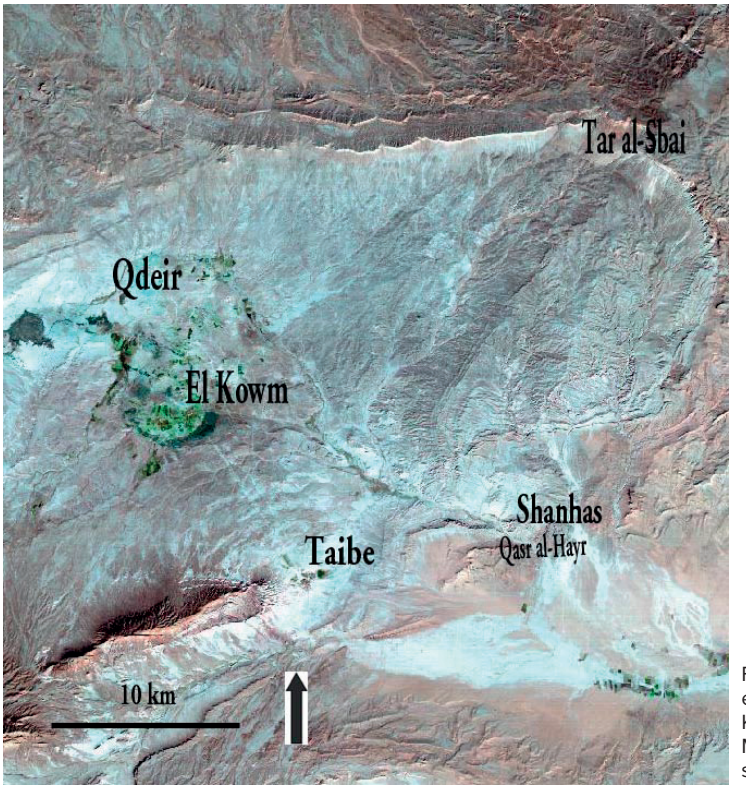

Figure 4. Tar al-Sbai on the western part of Jebel Bishri and the El Kowm Oasis beneath. Mapping by Minna Lönnqvist (Silver) on Landsat-7 image.

Table 1. Site types of SYGIS, the Finnish survey and mapping project in Syria 2000–2010.

SITE TYPE	NUMBER OF SITES
bedouin compound, historical	5
varied bedouin compound: compound with well	2
varied bedouin compound: compound with road	1
varied bedouin compound: compound with storage space	1
varied bedouin compound: compound with open-air site	1
bridge site, Roman, Ottoman	2
cairn/tumulus site, mainly metal periods	31
varied cairn/tumulus site: ring-tumulus site	3
varied cairn/tumulus site: ring-tumulus, Islamic grave, rujm marker	1
varied cairn/tumulus site: ring-tumulus, cairns/tumuli, stone lines	1
varied cairn/tumulus site: cairn/tumulus, stone circles, hunting blind	3
varied cairn/tumulus site: cairn/tumulus, stone circles	2
varied cairn/tumulus site: cairn/tumulus, stone enclosures/corrals	4
varied cairn/tumulus site: cairn/tumulus, house vase, stone structure	1
varied cairn/tumulus site: cairn/tumulus, hunting blind	1
varied cairn/tumulus site: cairn tumulus, stone lines, stone wall	1
varied cairn/tumulus site: cairn/tumulus, stone lines	1
varied cairn/tumulus site: cairn/tumulus, stone walls	1
varied cairn/tumulus site: cairn/tumulus complex	1
varied cairn/tumulus site: cairn/tumulus, boat-like structure, stone wall	1
cist tomb site, mainly metal period	12
fort, fortlet, Roman	3
house, stone enclosures	1
hunting site, hunting blind (see also cairn/tumulus complexes)	5
huts	1
Islamic grave site	4
military camp, Roman	1
open-air site, accumulated, prehistoric	37
varied open-air site: open-air site, bedouin compound	1
varied open-air sites: open-air site, road	3
varied open-air sites: open-air site, cairns-tumuli	3
varied open-air site: open-air site, undefined tomb	1
road, ancient (Assyrian?), Roman	5
rock-cut tombs, Roman/Byzantine	2
rock-cut graveyards, Roman/Byzantine	2
rock-shelter, prehistoric (abri)	5
settlement, Epipaleolithic/Neolithic (PPNB)	1
stone enclosure/corral site, Neolithic/metal periods	51
varied stone enclosure site: stone enclosure, water harvesting site, dam	1

stray find?	2
tell/settlement, metal periods	2
tent base, bedouin	3
varied tent base site: tent base, rock shelter, hunting blind	1
terrace	2
tower	3
undefined graveyards	5
undefined structures	1
water harvesting site, with tower	1
water source, well	2
well, water canal (qanat)	2
	226

mountainous region through millennia (see Table 1). These structural remains mainly dated to the Chalcolithic and Bronze Age. The site types indicated the strong pastoral impact in the region, reflecting human–animal interactions in the pastoral context for millennia. There were complexes of ring-*tumuli* (Figure 6), megalithic stone circles, walls and lines in the varied cairn/*tumulus* site repertoire (see Lönnqvist *et al*. 2006a).

Bedouins have also later been engaged in small livestock in the area (Figure 7), and the camel has been commonly herded in recent times as well. A GIS-based site-catchment analysis was carried out to calculate the pastoralists' hiking distances between the animal pens and water sources on the mountain (Lönnqvist *et al*. 2009a; see also Lönnqvist *et al*. 2011). The area had become the ground for development of *transhumance*, a mode in pastoral-nomadism that continued the pastoral movement from base villages between the piedmont areas and the mountain range. The evidence and the study of the continuity from the hunter-gatherer subsistence economy to pastoral nomadism was realised in the region where pastoral nomadism was emerging in the Pre-Pottery Neolithic B period (Lönnqvist 2014a).

The West Semitic people living in the region of Jebel Bishri have been known for their semi-nomadic and pastoral mode of life, with Amorites belonging to nearly the entire Bronze Age and Arameans being present from the Iron Age and continuing their heritage to the present-day Syriacs. Ancient cuneiform texts mentioning Mount Bashar, i.e., Jebel Bishri, tell about MAR.TU/*Amurru* Amorite tribes that were active on the mountain and in the surrounding areas from the Sumerian and the Akkadian domination of Mesopotamia in the Early Bronze Age. Urban Syrian kingdoms such as Ebla in the Early Bronze Age and Mari in the Middle Bronze Age reported on the surrounding tribes in the region (Figure 8). The Ebla cuneiform sources from the late third millennium even located the earliest Amorite kingdom to the neighbourhood (see Lönnqvist *et al*. 2006a; Lönnqvist *et al*. 2011; Silver 2014a).

According to the second millennium Mari cuneiform sources of the Middle Bronze Age, the Sutean tribe was especially occupying the mountain of Jebel Bishri and the desert towards Tadmor/Palmyra (Silver *et al*. 2018), while the Benjaminites were rearing their flocks on the piedmont along the Euphrates (Lönnqvist *et al*. 2011). The former tribe seems to have been more nomadic than the latter, and its relation to the West Semites is disputed. The tribal differences were apparently visible in the differences in the types of burial grounds on the mountain and in the Euphrates valley: The mountain is the location of cairns/*tumuli*, while the Euphrates piedmont mainly comprises shaft-graves and cist-graves (Lönnqvist *et al*. 2010b).

Figure 5. Stone enclosures/corrals on the central area of the mountain. Photo: Minna Lönnqvist.

Figure 6. Measuring and documenting a large ring-*tumulus* on the mountain. Photo: Gullög Nordquist.

Figure 7. Pastoral landscape and small livestock rearing on Jebel Bishri. Photo: Gullög Nordquist.

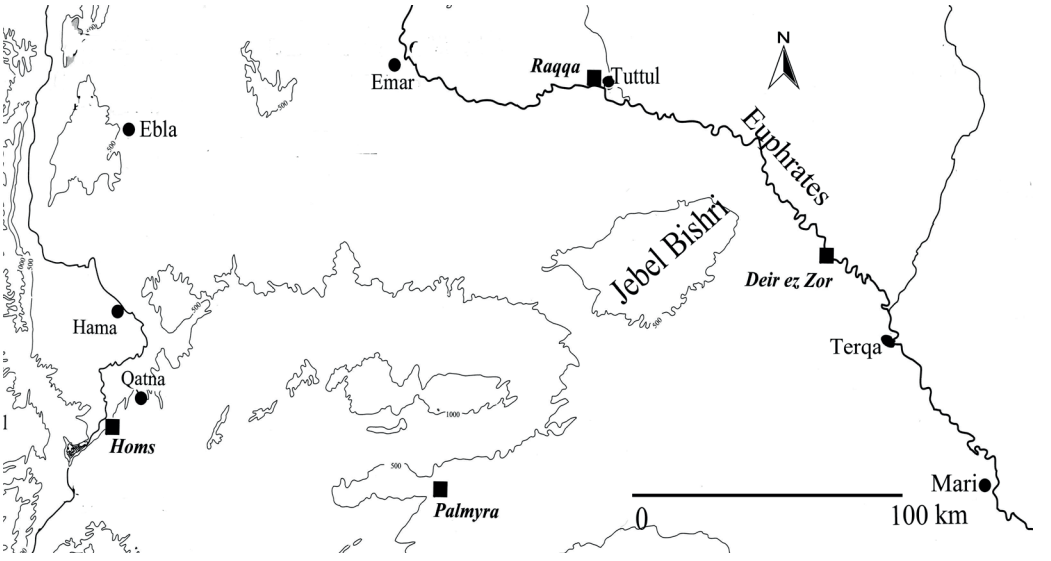

Figure 8. The location of Jebel Bishri in between the kingdoms of Ebla and Mari. Mapping by Minna Lönnqvist (Silver) on the Japanese Tell Kerkh expedition base map.

A popular account of the project work was published in 2000 (Lönnqvist 2000b). The initial survey results were presented in 2001 at *The 47th Rencôntre Assyriologique Internationale (RAI)* in Helsinki, Finland (Lönnqvist & Stout Whiting 2001) and in Liverpool, England, at a conference on the Ancient Near East in the 5th millennium. The question of the Amorites and their movements related to the survey were discussed at *The 4th International Congress on the Archaeology of the Ancient Near East (ICAANE)* in Berlin, Germany, in 2004 (Lönnqvist 2008b). Invited presentations were delivered in *The Levant in Transition* conference at the British Museum in London, England, in 2004 (Lönnqvist 2009), at a conference on *The Itineraries in the Ancient Near East* arranged in Udine, Italy, in 2004 (Lönnqvist *et al.* 2006a) and as special invited lectures at the Universities of Halle-Wittenberg and Leipzig in Germany in 2005. Based on cooperation with the Italians, the preliminary project reports were published in *KASKAL*, the Italian journal of the ancient Orient (Lönnqvist *et al.* 2006a; 2009b), and German cooperation began in Halle.

The project was also invited to present results to the conference on *Formation of Tribal Communities: Integrated Research in the Middle Euphrates, Syria*, in Tokyo, Japan, in 2009 (Lönnqvist *et al.* 2010b). The Japanese had started a joint project in the neighbourhood with the Syrians. Questions of tribalism were in focus at the conference, and a view of tribal differences in the tomb types on Jebel Bishri region were traced and presented by SYGIS (Lönnqvist *et al.* 2010b). The questions of the clashes between urban societies and tribal Amorites (Lönnqvist 2010a) and Arameans were further dealt with based on the studies on the ground. The third millennium climate change as a factor of the movement and peaceful or violent sedentarisation of the Amorite tribes was studied and discussed based on the results from the data captured on the field (Silver 2016a). The principal investigator also studied the occurrence of donkey burials related to Amorite pastoralisn and the West Semitic sacrificial tradition of tribal contract making in the neighbourhood (Silver 2014a).

Sedentarisation in action

The landscape studies were applied to understanding the changes in the pastoralists' mobile lives and their sedentarisation process. Differences were visible in the archaeological remains on the mountain compared to the piedmont, and the dichotomy was discussed in the 5th ICAANE in

Madrid, Spain, in 2006 (Lönnqvist *et al.* 2006b). The relationship of the mountain with the Euphrates River zone and the settled agricultural village life was also studied by analysing the river channel changes and their impact on the settlements in the fluvial plain (Lönnqvist *et al.* 2007; Lönnqvist 2014c).

Lönnqvist, the principal investigator, organised an international conference on the Amorites with the ARAM Society of the Oxford University in 2011 to present the theory of the earliest state of the Amorites (Silver 2014a) in relation to Jebel Bishri. The Ebla cuneiform sources pointed to the existence of the initial Amorite kingdom called MAR.DU-ki in the region already during the Early Bronze Age, i.e., in the third millennium BC (Lönnqvist *et al.* 2011; Silver 2014a). Pottery related to Uruk and the Sumerians, Ebla and Mari was recovered from Tell Tibne (Figure 9) on the Euphrates piedmont. The connection to Ebla and the possibility of Tell Tibne serving as a harbour for the Kingdom of Ebla was presented based on the topography and the surveyed pottery. The Akkadians fought against the Amorites (Frayne 1993, 90–94) and against a Sumerian coalition at the mountain.

The existence of the Sumerians was indicated on the Euphrates side based on the accounts inscribed in Gudea Statues A and B (Louvre AO 2) as well as in the pottery. Tell Tibne connected with the mountain quarries could already have served as a good harbour for Sumerian Gudeas transporting stone to their temple projects down the river. The written sources also confirmed the Sumerian presence and colonisation of the area in the Early Bronze Age (see Buccellati 1966). Some Ebla and Mari rulers became related to the Amorites in the Middle Bronze Age after the larger scale sedentarisation of the tribes that had occurred, and Amorite hegemony had taken over to rule the kingdoms. Based on our archaeological evidence and a suggestion made by Professor Jean-Marie Durand, it is likely that Tibne beneath Jebel Bishri was Gânibatum, the Euphrates harbour of Dûr Yahdumlim, the Fortress of the Amorite Mari King Yahdunlim (Lönnqvist *et al.* 2011).

In 2006 the Finnish project discovered an earlier unknown tell, a ruined mound of a settlement on the Euphrates piedmont of Jebel Bishri. The tell (Figure 10) was named Tell Kharita according to the name of the village, and

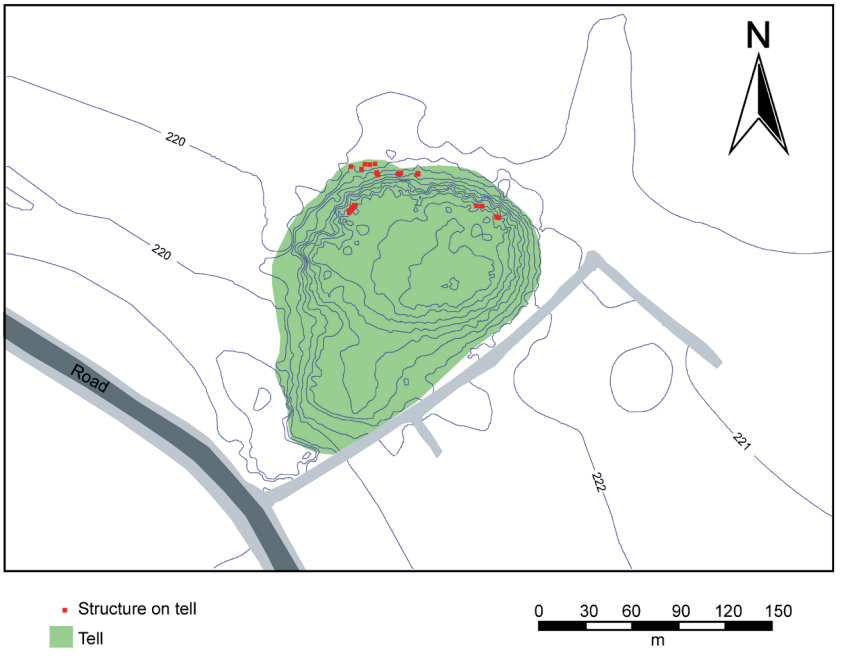

Figure 9. Tell Tibne. Mapping by Jari Okkonen.

we discovered Uruk impact there. We were able to archaeologically trace that there was evidence of an intimate relationship between the mountain people and the site in the Euphrates valley, and the sedentarisation process was visible in the emergence of settlements on the Euphrates piedmont from the Early Bronze Age. Middle Bronze Age connections to the Kingdom of Mari down the Euphrates were visible. Apart from the pottery related to Sumerian and Mari connections of the Early and Middle Bronze Age, Tell Kharita provided inscribed pottery and a tile with a reference to Aramean scribal systems, according to Professor Gianni Lanfranchi (Lönnqvist 2010a; Lönnqvist *et al*. 2011).

Jebel Bishri had become the target of the Assyrian kings during the Iron Age, and conflicts between them and the Aramean tribes of the mountain were reported in cuneiform sources. Battlefield archaeology was applied to study the landscape and sites on the Euphrates side, such as at Tell Kharita, to compare the sites and the finds with the Assyrian sources' accounts (Darmark 2008; Lönnqvist 2010a; Lönnqvist *et al*. 2011; Silver 2019). It seems that the Tell Kharita site had been occupied by the Arameans and probably took part in a conflict with the Assyrians.

A question has been raised about the relationship between the Amorites and the Arameans, that is, whether the Arameans were related to the earlier Amorites (see, e.g., Bodi 2014). Supporting evidence exists for the continuity of the occupation by both West Semitic tribal people in the area of Jebel Bishri and its Euphratine piedmont. Aramean-related studies were gradually extended by the principal investigators to the Balikh and the Tigris areas after the Arab Spring of 2011 and during the continuation of the Syrian civil war. The Finnish-Swedish archaeological project was launched in Mesopotamia in the Tigris valley area in 2015–2016 (Silver *et al*. 2017; forthcoming final report). The studies have been further based on the rich material on Jebel Bishri, the Euphrates, the Balikh and the Tigris valleys in the form of articles on the Arameans in *ASORblog* (Silver 2016b) and in the *ARAM* journal (Silver 2019) of Oxford.

SYGIS also carried out ethnoarchaeological studies at semi-sedentary Bedouin sites on the mountain and on the western piedmont, where a seasonally abandoned village of Shanhas was documented and studied. The process of abandonment, its seasonality and relationship with climate change were studied. Satellite image analyses were used in studying desertification and its impact on Bedouin life. Informants were used in interviewing the locals and their views on changing situations (Lönnqvist & Törmä 2006). Further studies were dealt with based on the studies of the changing line of desertification on satellite imagery compared to the existence of Bedouin compounds (Lönnqvist *et al*. 2008).

In some respects, the environmental conditions of the recent decades and their impact on the Bedouins were able to be compared with the ancient changing situations of the pastoralists living in the region. Drought and desertification had an effect on movement and sedentarisation (Lönnqvist *et al*. 2010a; 2011; Lönnqvist & Lönn-

Figure 10. Tell Kharita covered by a modern Islamic graveyard from the SW. Photo: Minna Silver.

qvist 2012). This meant the continuing of the identified phenomena as *longue durée* in the region. Studies on the Bedouin compounds in question were further presented to the Finnish-Arabic Society in Helsinki, Finland, in 2014 (Lönnqvist 2014b).

The Roman and Byzantine borderland

Along with Prehistoric, Bronze and Iron Age evidence, Jebel Bishri and its remains included a wealth of evidence from the Roman and Byzantine eras that showed their connection to the *Strata Diocletiana* on the western piedmont and the Euphrates Limes. We deviated from the project's main aim – to study pastoralism – to study also Roman remains that needed to be recorded and documented. We surveyed and documented the Late Roman – Byzantine fort of Tabus (Figure 11) facing the Euphrates on the Jebel Bishri cliff (Lönnqvist 2005c; Lönnqvist *et al.* 2005a; 2005b). Tell Tibne beneath also provided ruins and Roman-Byzantine pottery with stamps. The connection to the fortress of Dura Europos on the Euphrates was visible in the finds of Tabus and Tibne (Lönnqvist *et al.* 2011).

The question of whether the sites are associated with Emperor Diocletian's Forts of Mambri or with the Fortress of Zenobia on the peninsula of Halabiya (a basalt massive belonging to Jebel Bishri, see Lönnqvist 2003b) has been discussed (Lönnqvist *et al.* 2011). Roman roads were studied along the Euphrates and on the mountain, and computer-based GIS viewshed analyses between the forts were carried out (Lönnqvist *et al.* 2005a; Silver *et al.* 2005b; 2015a). Viewshed studies were further applied later to the region's ancient tower tombs (Silver *et al.* 2015b). The Roman remains were also associated with the region's gypsum and marble quarrying that was dealt with in a stone workshop in Petra, Jordan, in 2010 (Lönnqvist 2010b).

The project found several Roman sites in the mountain's inner areas, in addition to the Euphrates piedmont and the mountain edge. A Roman military camp was found by using QuickBird satellite imagery. The site was visited on the ground and was providing Roman pottery and glass. The fortlet of Qseybe was also documented on the ground for the first time. Several sites, such as tombs and the military fort of Qebaqeb, were documented and studied on the eastern piedmont (see Lönnqvist *et al.* 2011; Silver *et al.* 2020). The German Archaeological Institute and the Danish Archaeological Institute in Damascus invited Minna Lönnqvist, the principal investigator, to lecture on the forts in the Roman Eastern Frontier zone for their project, *Focus on Fortification*, in 2010 just before the civil war's outbreak (Lönnqvist 2010c). The Roman Eastern border zone was also later approached by the principal

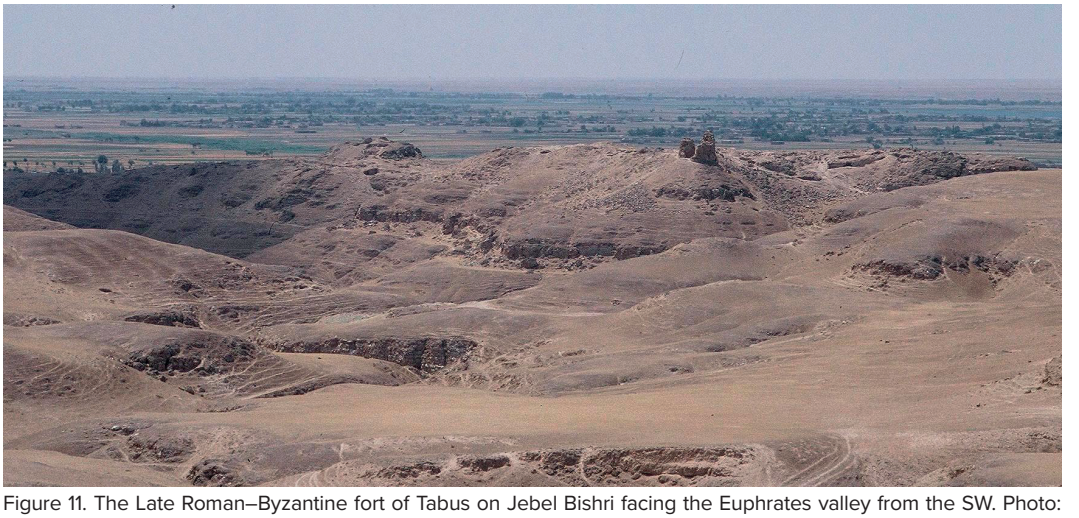

Figure 11. The Late Roman–Byzantine fort of Tabus on Jebel Bishri facing the Euphrates valley from the SW. Photo: Minna Silver.

investigators for the Finnish-Swedish archaeological project in Mesopotamia in the Tigris valley area in 2015–1016 (Silver *et al*. 2017; Silver *et al*., forthcoming final report), resulting in the joint results with SYGIS (Silver *et al*. 2020).

Conclusions and discussion

The Finnish SYGIS project of the University of Helsinki archaeologically studied the mountainous area of Jebel Bishri in Central Syria between the Euphrates and the Syrian Desert for over ten years from 2000–2010 by applying remote sensing for prospecting and field surveying, using GIS for site recording and mapping. The project included educational dimensions in the form of a Nordic PhD course with its seminar publication and GIS training for members of DGAM, the Syrian antiquities authority.

The project's main aim had been to survey and map Jebel Bishri by remote sensing and, archaeologically, the desert-steppe area that had largely remained *terra incognita*. The purpose was to study the relation of pastoral nomads of the mountain with the village life of the Euphrates valley and the piedmonts, based on the captured data. It was known from the Mesopotamian cuneiform sources that the area was called 'the mountain of the Amorites' and 'the mountain of the Arameans'.

The participation in NASA's world-offered, remote-sensed data from the X-SAR 2000 shuttle mission enabled us to study the environment and landscape and to build landscape models in 3D. The project was able to carry out GIS analyses to study site visibilities and hiking distances between the pastoral sites and the available water sources on the mountain. Aerial maps and topographic maps were used in addition to satellite maps produced from Landsat-7 satellite images. The whole mountain was covered by prospecting with satellite images, and the field work was carried out in transects in differing environmental zones on the ground.

Altogether 226 sites were recorded and documented. Among them, the majority were those of mobile hunter-gatherers and pastoralists comprising open-air sites, corrals cairns/*tumuli* and megalithic structures, the latter being typical of nomadic technocomplexes. It was therefore realised that the mountain mostly provided sites of the mobile hunter-gatherers and pastoralists. The small finds at the mountain sites were mainly worked flints, and pottery finds were very meager. The emergence of sedentary sites on the Euphrates piedmont area along Jebel Bishri could be at least partly related to the Amorites' large-scale sedentarisation. That was the time of the emergence of the earliest state of the Amorites, namely MAR.DU-ki, mentioned in the cuneiform sources, that was identified by the principal investigator to the area of Tuttul beneath Jebel Bishri. Tell Tibne in the piedmont provided evidence of contacts with the kingdoms of Ebla and Mari in the comparable pottery finds.

A previously unknown tell was identified in the northeastern piedmont area and named Tell Kharita according to the village where it is situated. The tell provided evidence of pastoralism in pottery styles and connection to the Amorite-occupied kingdom of Mari further down the Euphrates valley. The finds also included the Aramean inscription style. According to its location on the mountain's piedmont at the edge of the Euphrates, it had seemingly been involved in the battles between the pastoral Arameans and the Assyrians, identifiable in the battles mentioned in the cuneiform texts. The longue durée appeared in the continuity of the mobility of life from prehistoric hunter-gatherers to the Bronze Age and Iron Age pastoral nomads to the present-day Bedouins, the latter studied ethnoarchaeologically, in the region. There was the continuity in the cyclic lifestyle that included highland-lowland interactions based on animal husbandry, from mobility to sedentarisation and small-scale cultivation.

The final project reports came out in the *BAR International Series* (Lönnqvist 2008a; Lönnqvist *et al*. 2011). All the sites were published on time just before the breakout of the Syrian civil war. A final view of the visibility of the pastoral nomads from the Jebel Bishri experience was presented in the invited lecture Visualizing the Invisible Nomads in Past and Present Syria at World Heritage Strategy Forum, delivered by the principal investigators at Harvard University in Cambridge, Mass., USA, in 2016 (see Silver 2016c).

However, it is clear that the consequences of the civil war have been devastating for the Syrian people, and the country's cultural heritage, including Jebel Bishri (see Silver 2017a; Silver 2021a) that was occupied by ISIS/ISIL (the Islamic State of Iraq and Syria/the Islamic State of Iraq and the Levant) in 2013–2015. DGAM reported looting at the site of the Late Roman Fortress of Tabus on Jebel Bishri, and ISIS established the capital of its caliphate in Raqqa beneath Jebel Bishri.

The finds of the Jebel Bishri project were being housed at the Museum of Palmyra when ISIS captured Palmyra in 2015, destroying the ruins and finds in the museum. The former Director of the museum, Dr. Khaled al-As'aad, was executed and his son, then Director of the museum, Waleed al-As'aad, was tortured. SYGIS had worked cooperatively under them, and another one of the sons, Mohammed al-As'aad, had worked in our project. No one knows the whereabouts of the finds of the Finnish project after the looting (see Karlsson 2015; Pettersson 2015a, 2015b; Tuohinen 2016).

Minna Silver, the principal investigator, and Professor Michael Doneus arranged for a workshop at the 10th International Congress on the Archaeology of the Ancient Near East (ICAANE)in Vienna, Austria, in 2016 to discuss the challenges, strategies and high-tech applications to save the cultural heritage of Syria (Silver 2022b). The ICOMOS-Finland arranged a conference on the Syrian heritage in Helsinki, Finland, for the 50th anniversary of the association in 2017 and launched a publication of the post-trauma reconstruction (see Silver 2017). The principal investigator further published a book that dealt with the revival of Palmyra related to the destruction at the site (Silver *et al.* 2018). The hopes for the new era, for rescuing and preserving the archaeological heritage in the region of Jebel Bishri, need to be cherished. The studies of Jebel Bishri have and will be continued.

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